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Bitcoin: A New Form of Investment or Another Traditional Asset?

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Bitcoin: A New Form of Investment or Another Traditional Asset?

ABSTRACT. Previous studies have compared Bitcoin to financial assets (bonds and stocks) or commodities (gold, crude oil, and silver) or fiat monies (USD, JPE, etc.) This might cause a problem because Bitcoin is different from those traditional assets due to it being extremely risky, illegal in many places, and not presenting any real cash flows like stocks or bonds. Our paper focuses on comparing Bitcoin with traditional assets of similar risk-return profile such as public small capitalization stocks, OTC stocks, IPO stocks, and junk bonds. We find that Bitcoin experienced the highest return and was not correlated to those assets. That means Bitcoin can offer substantial diversification benefits to investors. We further examine factors that determined Bitcoin's returns and find that among the five common factors that have been shown as drivers of stock returns, only three factors played a role in Bitcoin's returns. They were the market factor (MKTRF), the profitability factor (RMW) and the investment factor (CMA).

WILLIAM GREGG VI began a working relationship with Professor Nguyen Thanh in the Spring of 2020. At the end of class one day, William mentioned that he was studying to be an Economics Professor. Professor Thanh asked if William wanted to participate in a professor-student project.



Since then, they have published three research projects to Upstate and will continue to work together in the future. The best part of his research experience with Dr. Thanh is the excitement it brings to his life. The excitement of accomplishing meaningful work and having something to show for said work is truly motivating. Professor Thanh's insight and guidance also inspire William as he continues to learn real world applications of Economics and Finance. There is only so much a textbook can teach you, and William has read plenty, but the guidance and friendship of a professional is by far the best vehicle for converting textbook knowledge into real world application. William has tutored Mathematics since high school and currently tutors Mathematics, Economics, and Deductive Logic for USC Upstate. The publishing

experience, working connections, and experience as a tutor are all steps in the right direction towards becoming a professor. The best advice William has for anyone interested in conducting research is that the hardest part is finding a starting place. We are but small fish in an ocean of information. The first step is to look through it. Don't start writing anything down until you find a new angle, a self-discovery that sparks your interest, and then see how far the rabbit hole goes. The primary tools you need are a desire to work hard and the humility to ask for help.



THANH NGUYEN is originally from Vietnam and received his Ph.D. from the University of South Florida in 2013. He has been at the University of South Carolina Upstate since August of 2018. Dr. Nguyen's current research focuses on behavioral finance, mergers and acquisitions, market efficiency, IPOs, and payout policies. He has most recently published peer-reviewed articles in the *Journal of Behavioral Finance*; *Global Finance Journal*; *Review of Quantitative Finance and Accounting*; *Review of Accounting and Finance*; *Managerial Finance*; and the *Journal of*

Accounting and Finance.

I have been fortunate to have William Gregg in my finance courses. He is a hard-working, bright, and self-motivated student. We talked and he expressed his interest in finance and wanted to do more research in finance. He is a fast learner and can work effectively under pressure to

meet the deadlines. I strongly believe he has a potential to be a well-established scholar in the future.

1. Introduction and Literature Review

Bitcoin was released by an unknown person with the alias Satoshi Nakamoto in 2009. It is an electronic cash which allows online payments without the interference of third-party financial institutions [1]. Since banks are not involved, the payments are faster, and parties involved don't need to pay bank fees or any kind of transaction costs. A 2020 survey by HSB, a leading inspection and insurance company headquartered in Hartford, Connecticut, USA, found that 36% of small-medium businesses in the US accept Bitcoin. Other well-known companies that accept Bitcoin include Expedia, Microsoft, AT&T, KFC, Burger King, Starbucks, and Nordstrom. Some even predict digital currencies like Bitcoin might someday replace or at least coexist with fiat currencies. However, Bitcoin is considered by many as an extremely high risk/high reward investment asset rather than a method of payment. For example, its value fluctuated between \$700 and \$20,000 just in 2017 alone. However, Bitcoin is not the same as conventional fiat currencies such as the US Dollar or the Euro whose values are guaranteed by governmental authorities. Bitcoin also doesn't represent any cash flows generated by firms like stocks or bonds, and it has no real usage in practice like real estates, gold, silver or other commodities. Previous studies have compared Bitcoin with general stocks, bonds, gold, silver, and fiat monies [2]-[5]. However, this approach is problematic given the unique features of Bitcoin and its high risk and returns. Instead, to compare Bitcoin with its similar high risk and high return peers allow questions to be studied like: does Bitcoin offer higher returns in comparison to other assets with a similar risk-reward profile, does it offer any diversification benefit in forming an investment portfolio, is it correlated to any of the traditional financial assets, and are the same factors that successfully explain traditional assets able to explain Bitcoin's return? The knowledge yielded from answering these questions can benefit governmental authorities and investors. Through the examination of the correlation between Bitcoin and other conventional investment assets, governmental authorities can discern whether Bitcoin is a completely new form of investment with its own risk and return, or just another traditional financial asset. If Bitcoin is a new investment asset class, then governments should focus on the benefit of diversification for the investment side of Bitcoin and increase the regulation on cryptocurrencies to ensure a safer investment environment. If Bitcoin turns out to be different from the above conventional assets, then investors now have one more channel to invest and to diversify their portfolios. Investors will also benefit from the knowledge of which factors drive Bitcoin's returns and allow for informed, rational decision making when investing in Bitcoin.

2. Data and Methodologies

In order to compare Bitcoin with other investment asset categories including the entire stock market, small stocks, Over-The-Counter (OTC) stocks, Initial Public Offerings (IPO) stocks, junk bonds, high quality bonds, gold, USD/Euro rate (USD/EUR), and USD/Japanese Yen rate (USD/JPY) data was collected from Yahoo Finance and OTC Markets Group. The computation of the percentage of monthly returns for Bitcoin (BTC) was conducted using the 07/01/2010 to 10/01/2020 adjusted closing prices on Yahoo Finance; the S&P 500 index, Dow Jones, and Nasdaq were used to represent the stock market; while the Russell 2000 index was used as a proxy for returns of small firms. The Russell 2000 was created by the Frank Russell Company in 1984 and consists of the smallest 2,000 stocks in the Russell 3000. Three indices were used from the Over-The-Counter (OTC) stocks through the OTC Markets Group. Specifically, the OTCQX

Composite index was used as a benchmark for tracking the overall performance of the OTCQX Market, the top tier on OTC Markets. There are 326 members of the index, representing the most transparent domestic and international companies, but the OTCQX US focuses on 115 OTC stocks based in the U.S. while the OTCQX Banks index, created on Jan. 2, 2015, measures the performance of financial institutions on the OTC Markets and consists of companies from across the financial sector. For the IPO index, we use returns of the Renaissance IPO ETF. This ETF seeks to replicate the price and yield performance of the Renaissance IPO Index, before fees and expenses. It normally invests at least 80% of its total assets in securities that comprise the index. The index is a portfolio of companies that have recently completed an initial public offering ("IPO") and are listed on a U.S. exchange. For low quality or junk bonds, we use the Vanguard High-Yield Corporate Fund Investor Shares (VWEHX). This fund invests primarily in a diversified group of high-yielding, higher-risk corporate bonds-commonly known as "junk bonds" with medium and lower-range credit-quality ratings. For high quality bonds, we use Vanguard Total Bond Market Index Fund ETF Shares (BND) which seeks the performance of Bloomberg Barclays U.S. Aggregate Float Adjusted Index, consisting of public, investment-grade, taxable, fixed income securities in the United States. To compare Bitcoin with gold, the exchange rates between the U.S. Dollar and the Euro (USD/EUR), and the USD and Japanese Yen (USD/JPY) the SPDR Gold Shares (GLD), USD/EUR, and USD/JPY are applied and are provided by Yahoo Finance, respectively. To measure the volatility of the stock market in the future, we use the CBOE Volatility Index (VIX). VIX is a volatility index derived from S&P 500 options for the 30 days following the measurement date, with the price of each option representing the market's expectation of 30-day volatility. The resulting VIX index formulation provides a measure of expected market volatility on which expectations of further stock market volatility might be based.

[6] find that volatility, volume, and the returns for the previous two days play a role in Bitcoin's price. [7] find that the number of tweets can have an impact on performance of Bitcoin. [8] documents that market's uncertainty is a key factor in Bitcoin's returns. In this study, we use the five common factors that have been proved to be drivers of stock returns to examine whether they can explain Bitcoin's returns. In particular, we use the below multivariate regressions:

$$R_{b,t} - R_{f,t} = \alpha + \beta_b MKTRF_t + S_b SMB_t + h_b HML_t + e_{b,t}. \quad (1)$$

$$R_{b,t} - R_{f,t} = \alpha + \beta_b MKTRF_t + S_b SMB_t + h_b HML_t + k_b UMD_t + e_{b,t}. \quad (2)$$

$$R_{b,t} - R_{f,t} = \alpha + \beta_b MKTRF_t + S_b SMB_t + h_b HML_t + P_b RMW_t + e_{b,t}. \quad (3)$$

$$R_{b,t} - R_{f,t} = \alpha + \beta_b MKTRF_t + S_b SMB_t + h_b HML_t + R_b CMA_t + e_{b,t}. \quad (4)$$

$$R_{b,t} - R_{f,t} = \alpha + \beta_b MKTRF_t + S_b SMB_t + h_b HML_t + k_b UMD_t + P_b RMW_t + R_b CMA_t + e_{b,t}. \quad (5)$$

$R_{b,t}$ is the monthly returns of Bitcoin in month t ; $R_{f,t}$ is the 1-month U.S. Treasury bill rate in month t ; $MKTRF_t$ is the market factor and measured as the market risk premium. SMB_t is the size factor and measured as the difference between the returns on portfolios of small and big stocks in month t . HML_t is value factor and equal to the difference between the returns on portfolios of high and low book-to-market value of equity ratio in month t . RMW_t is the profitability factor that is the difference between the returns of firms with robust (high) and weak (low) operating profitability. CMA_t is the investment factor which is the difference between the returns of firms that invest conservatively and firms that invest aggressively [9]-[10]. We also include the Carhart's momentum factor (UMD_t) as suggested by [11]-[12]. Momentum in a stock is described as the tendency for the stock price to continue rising if it is going up and to continue declining if it is going down. It is measured as the difference in returns of winners and losers. The intercept (α) represents the monthly abnormal returns for Bitcoin. The data for all the risk factors are obtained

3. Empirical Results and Analyses

3.1 Descriptive Statistics

Table 1 shows descriptive statistics for monthly returns of Bitcoin and those of traditional investment assets. On average, investment in Bitcoin has been outstanding with a mean monthly return of 18.9% and median of 6.4%. It is easy to realize that Bitcoin returns were positively skewed with extremely large returns in some months. For example, Bitcoin return was 470.9% in 10/2013 and 346.1% in 3/2011. On the other hand, investing in Bitcoin is very risky as well. The overall risk (measured by its standard deviation) was 63.2% which was very high in comparison to traditional assets like stocks or bonds. The minimum return was -38.9% in 1/2014. The mean returns of the OTC stocks was ranked second after Bitcoin. In particular, the mean (median) monthly return was around 14% and 0.6%, respectively. The OTC stock returns were also positively skewed due to some extremely high-return outliers. The maximum return was 968% in 3/2015. The OTC stocks were extremely risky as evidenced by its largest standard deviation of 111%.

Table 1: Descriptive Statistics

Data is from Yahoo Finance and OTC Markets Group from 07/01/2010 to 10/01/2020. Monthly returns are computed for each assets including Bitcoin (BTC), three major indices (S&P 500 index, Dow Jones, and Nasdaq), and small stocks of public firms (Russell 2000 Index). For Over-The-Counter (OTC) stocks (OTCQX Com, we use three OTC market indices from OTC Markets Group. The OTCQX Composite index is used as a benchmark for tracking the overall performance of the OTCQX Market, the top tier on OTC Markets. The OTCQX US focuses on 115 OTC stocks which based in the U.S. The OTCQX Banks index measures the performance of financial institutions on the OTC Markets. For IPO index, we use returns of the Renaissance IPO ETF. For low quality or junk bonds, we use this Vanguard High-Yield Corporate Fund Investor Shares (VWEHX). This fund invests primarily in a diversified group of high-yielding, higher-risk corporate bonds-commonly known as "junk bonds"-with medium- and lower-range credit-quality ratings. For high quality bonds, we use Vanguard Total Bond Market Index Fund ETF Shares (BND). To compare Bitcoin with gold, the exchange rates between the U.S. Dollar and the Euro (USD/EUR) and the USD and Japanese Yen (USD/JPY), we use SPDR Gold Shares (GLD), USD/EUR, and USD/JPY provided by Yahoo Finance, respectively. VIX is a volatility index derived from S&P 500 options. It provides a measure of expected market volatility in 30 days.

Assets	Obs	Mean	Median	Std	Min	Max	Mean/Std	Median/Std
BTC	123	0.189	0.064	0.63	-0.389	4.709	0.299	0.101
S&P 500	123	0.010	0.015	0.039	-0.125	0.127	0.260	0.395
Dow Jones	123	0.009	0.010	0.038	-0.137	0.111	0.232	0.260
Nasdaq	123	0.014	0.019	0.045	-0.101	0.154	0.318	0.420
Russell2000	123	0.009	0.015	0.052	-0.219	0.150	0.172	0.289
OTCQXCom	71	0.140	0.006	1.149	-0.159	9.680	0.122	0.005
OTCQXUS	71	0.142	0.006	1.114	-0.248	9.385	0.128	0.006
OTCQXBank	69	0.142	0.010	1.114	-0.229	9.256	0.128	0.009
IPO	84	0.014	0.014	0.063	-0.158	0.190	0.228	0.222
Junk Bond	123	0.005	0.006	0.018	-0.100	0.054	0.302	0.344
High Bond	123	0.003	0.002	0.010	-0.026	0.031	0.303	0.166
Gold	123	0.005	-0.001	0.047	-0.111	0.123	0.099	-0.026
VIX	123	0.029	-0.009	0.261	-0.385	1.346	0.111	-0.033
USD/ EUR	123	0.001	0.000	0.024	-0.070	0.077	0.046	-0.003
USD/JPY	123	0.002	-0.001	0.024	-0.072	0.079	0.076	-0.039

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In order to make a better comparison in returns among assets, we scale the mean and median returns by the total risk (standard deviation). The last two columns in Table 1 show that the Mean/Std and Median/Std for Bitcoin were larger than those of OTC stocks. This indicates that investing in Bitcoin has been superior to investing in OTC from the risk adjusted basis.

In contrast, the stock market indices experienced very modest returns for the same period. On average, the three indices (S&P500, Dow Jones, and NASDAQ) earned less than 2% per month and were less subject to positive skewness than Bitcoin and OTC stocks. Interestingly, average return of the small cap stocks (Russell2000) was only 0.9% per month which was lower than those of three major indices even though the small cap stocks were more volatile as showed by a larger standard deviation (5.2%). Similarly, other assets such as IPO, Junk Bond, High Bond, Gold, USD/EUR, and USD/JPY experienced reasonable monthly returns and acceptable amount of risk. The standard deviation of IPO stocks and Gold were 6.3% and 4.7%, respectively. This indicates that investing in IPO stocks was riskier than investing in Gold; however, IPO stocks was rewarded by a higher median return. In particular, the median return of IPO stocks was 1.4% compared to -0.01% for Gold on a monthly basis.

3.2. Two Sample T-Test and Wilcoxon Sign Ranked Test

In Table 2, the two-sample t-test examines whether Bitcoin returns were higher than those of traditional assets over the last ten years (7/2010 to 9/2020).

Table 2: Returns Comparison Using Two Sample T-Test.

*Two-sample T-test is used to test the difference in means between Bitcoin (BTC) and another traditional asset. T-statistic is for the t-test. ***, **, and * represent 1%, 5%, and 10% level of significance, respectively.*

Bitcoin vs. Others	Mean BTC	Mean Others	Difference	t-Statistic
BTC vs. S&P500	0.189	0.010	0.179***	3.130
BTC vs. Dow Jones	0.189	0.009	0.180***	3.160
BTC vs. Nasdaq	0.189	0.014	0.175***	3.060
BTC vs. Russell2000	0.189	0.009	0.180***	3.150
BTC vs. OTCQXCom	0.189	0.140	0.049	0.390
BTC vs. OTCQXUS	0.189	0.142	0.047	0.370
BTC vs. OTCQXBank	0.189	0.142	0.047	0.370
BTC vs. IPO	0.189	0.014	0.175*	2.520
BTC vs. JunkBond	0.189	0.005	0.184***	3.220
BTC vs. HighBond	0.189	0.003	0.186***	3.260
BTC vs. Gold	0.189	0.005	0.184***	3.230
BTC vs. USD/EUR	0.189	0.001	0.188***	3.300
BTC vs. USD/JPY	0.189	0.002	0.188***	3.280

Table 2 shows that Bitcoin returns were significantly different from returns of the three market indices and the small cap stocks (Russell 2000). Similarly, Bitcoin returns were economically and statistically greater than those of traditional investment assets such as IPO stocks, Bonds, or foreign currencies (Euro or Japanese Yen). This is consistent with what has been observed in Table 1 above. Interestingly, even though Table 1 shows that Bitcoin earned higher returns than OTC stock, Table 2 indicates that this difference is not statistically significant. In other words, investors should expect to earn the similar returns either investing Bitcoin or OTC stocks since they are both considered high risk/high return assets.

3.3. How did Bitcoin correlate to other assets?

The documentation this far has shown that investing Bitcoin and OTC stocks leads to higher returns in comparison to other traditional investments (overall market, small cap stocks, IPO stocks, Bonds, Gold, and currencies). The next task is to examine whether Bitcoin offers any diversification benefit in investing. Diversification is a desirable feature in investment and an asset offers this diversification benefit when that said asset doesn't have a perfectly positive correlation with the investor's existing portfolio ($\rho = 1$). A low correlation coefficient is more desirable since it offers a higher Sharpe's ratio for the portfolio. Especially, a negative correlation which is rare and could offer the highest diversification benefits in forming the optimal portfolio.

Table 3: Pearson Correlation Coefficients

*This table shows the correlation coefficients among different assets and the p-value. ***, **, and * represent 1%, 5%, and 10% level of significance, respectively.*

	BTC	S&P 500	NAS-DAQ	RUS 2000	OTC QXCom	IPO	Junk Bond	Gold	VIX	USD EUR
BTC	1 0.09 123	0.151* 0.09 123	0.135 0.13 123	0.121 0.17 123	-0.047 0.69 71	0.091 0.40 84	0.140 0.12 123	0.002 0.97 123	-0.136 0.13 123	-0.081 0.36 123
S&P 500	0.151* 0.09 123	1 0.09 123	0.949*** .00 123	0.874*** .00 123	0.031 0.79 71	0.768*** .00 84	0.756*** .00 123	0.112 0.21 123	-0.727*** .00 123	-0.346*** .00 123
NAS-DAQ	0.135 0.13 123	0.949*** .00 123	1 0.00 123	0.840*** .00 123	0.016 0.89 71	0.831*** .00 84	0.694*** .00 123	0.133 0.14 123	-0.652*** .00 123	-0.346*** .00 123
RUS 2000	0.121 0.17 123	0.874*** .00 123	0.840*** .00 123	1 0.00 123	-0.047 0.69 71	0.713*** .00 84	0.677*** .00 123	0.083 0.35 123	-0.631*** .00 123	-0.292*** 0.00 123
OTC QX Com	-0.047 0.69 71	0.031 0.79 71	0.016 0.89 71	-0.047 0.69 71	1 0.71 71	-0.025 0.83 71	0.071 0.55 71	-0.023 0.84 71	-0.061 0.60 71	-0.158 0.18 71
IPO	0.091 0.40 84	0.768*** .00 84	0.831*** .00 84	0.713*** .00 84	-0.025 0.83 71	1 0.84 84	0.699*** .00 84	0.089 0.41 84	-0.544*** .00 84	-0.134 0.22 84
Junk Bond	0.140 0.12 123	0.756*** .00 123	0.694*** .00 123	0.677*** .00 123	0.071 0.55 71	0.699*** .00 84	1 0.123 123	0.249*** 0.00 123	-0.504*** .00 123	-0.321*** 0.00 123
Gold	0.002 0.97 123	0.112 0.21 123	0.133 0.14 123	0.083 0.35 123	-0.023 0.84 71	0.089 0.41 84	0.249*** 0.00 123	1 0.76 123	-0.027 0.76 123	-0.321*** 0.00 123
VIX	-0.136 0.13 123	-0.727*** .00 123	-0.652*** .00 123	-0.631*** .00 123	-0.061 0.60 71	-0.544*** .00 84	-0.504*** .00 123	-0.027 0.76 123	1 0.123 123	0.158* 0.08 123
USD EUR	-0.081 0.36 123	-0.346*** .00 123	-0.346*** .00 123	-0.292*** 0.00 123	-0.158 0.18 71	-0.134 0.22 84	-0.321*** 0.00 123	-0.321*** 0.00 123	0.158* 0.08 123	1 0.123 123

Table 3 shows the results of our Pearson correlation test. The first column shows that Bitcoin didn't have a perfectly positive correlation with other assets. As mentioned above, this indicates that Bitcoin can offer the diversification benefit and can potentially improve an investor's portfolio by improving its Sharpe ratio. In particular, only the correlation coefficient of Bitcoin and the S&P500 was significant at 10% level of significance; however it was very small, 0.151. The rest of the coefficients showed that Bitcoin was not correlated to any other traditional assets. This shows that Bitcoin does offer diversification benefit and is actually a real "new game in town" added to traditional investment assets. As we can see from the table, traditional assets such as tech-oriented firms (Nasdaq), small firms (Russell 2000), IPO stocks, and Junk bonds (Junk Bond) normally have a positive and strong correlation with the stock market (S&P 500). For example, the coefficient of Nasdaq and Russell 2000 is 0.95 and 0.87, respectively. Gold seems to be another good candidate for diversification purpose. Its coefficient was 0.11 and not significant.

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We also examine whether Bitcoin correlates to the VIX index (VIX) which is a popular measure of the stock market's expectation of volatility based on S&P 500 index options and often referred to as the fear index or fear gauge. An increase in VIX is the indication of a riskier stock market and a higher fear among investors. Table 3 shows that the coefficient between the S&P500 and VIX is -0.727 and significant at 1% level of significance. This means the S&P500 experienced a higher return when the VIX was low or a low level of fear among investors. However, the correlation between Bitcoin and VIX was -0.13 but not significant. In other words, returns of Bitcoin were independent to investors' fear. This could be a reason why Bitcoin was different from and uncorrelated to traditional investment assets as mentioned before. In the next section, we will examine what factors determine Bitcoin's return.

3.4 What factors derived Bitcoin returns?

Since Bitcoin has been a "new game in town". It is interesting to see whether factors that have been proved to be determinants of returns of stocks could also play a role in Bitcoin's returns. Following the literature, we implement a variety of multivariate models to examine Bitcoin's returns.

Table 4: Multivariate regression analyses.

*This table shows regression results of our tests on what factors drive Bitcoin's returns. We use the following models: $R_{b,t} - R_{f,t} = \alpha + \beta b MKTRF_t + \beta b SMB_t + \beta b HML_t + e_{b,t}$. (1); $R_{b,t} - R_{f,t} = \alpha + \beta b MKTRF_t + \beta b SMB_t + \beta b HML_t + \beta b UMD_t + e_{b,t}$. (2); $R_{b,t} - R_{f,t} = \alpha + \beta b MKTRF_t + \beta b SMB_t + \beta b HML_t + \beta b RMW_t + e_{b,t}$. (3); $R_{b,t} - R_{f,t} = \alpha + \beta b MKTRF_t + \beta b SMB_t + \beta b HML_t + \beta b CMA_t + e_{b,t}$. (4); $R_{b,t} - R_{f,t} = \alpha + \beta b MKTRF_t + \beta b SMB_t + \beta b HML_t + \beta b UMD_t + \beta b RMW_t + \beta b CMA_t + e_{b,t}$. (5). $R_{b,t}$ is the monthly returns of Bitcoin in month t ; $R_{f,t}$ is the 1-month U.S. Treasury bill rate in month t ; $MKTRF_t$ is the market factor and measured as the market risk premium. SMB_t is the size factor and measured as the difference between the returns on portfolios of small and big stocks in month t . HML_t is value factor and equal to the difference between the returns on portfolios of high and low book-to-market value of equity ratio in month t . RMW_t is the profitability factor that is the difference between the returns of firms with robust (high) and weak (low) operating profitability. CMA_t is the investment factor which is the difference between the returns of firms that invest conservatively and firms that invest aggressively. UMD_t is the momentum factor. The intercept (α) represents the monthly abnormal returns for Bitcoin. t -statistics are in square bracket. ***, **, and * represent 1%, 5%, and 10% level of significance, respectively.*

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept (α)	0.120*	0.111*	0.110*	0.105*	0.088
	[1.89]	[1.74]	[1.76]	[1.66]	[1.4]
MKTRF	0.021	0.027*	0.021	0.027*	0.031*
	[1.36]	[1.63]	[1.34]	[1.71]	[1.94]
SMB	0.014	0.016	0.032	0.017	0.037
	[0.51]	[0.58]	[1.11]	[0.64]	[1.31]
HML	0.001	0.016	-0.001	-0.026	-0.010
	[0.04]	[0.63]	[-0.06]	[-0.94]	[-0.34]
UMD		0.028			0.028
		[1.30]			[1.36]
RMW			0.078**		0.079**
			[1.98]		[2.02]
CMA				0.083*	0.076*
				[1.75]	[1.61]
F Stat	1.170	1.300	1.870	1.660	2.07*
Adj. R ²	0.004	0.009	0.028	0.212	0.050
N	123	123	123	123	123

Table 4, model 1 shows the result of the Fama-French three-factors model [2]. None of the three factors could explain Bitcoin's returns. Specifically, the coefficients on the market factor (MKTRF), the size factor (SMB), and the value factor (HML) were 0.021, 0.014 and 0.001 and not significant. This might be the reason we see the abnormal return (α) was 0.12 and significant at 10% significance. Since model 1 failed to explain Bitcoin's returns, in model 2, 3, 4, and 5 we add other factors including the Carhart momentum factor (UMD), Fama and French profitability factor (RMW) and the investment factor (CMA). Model 2 shows that the coefficient of UMD was not significant and unable to explain Bitcoin's returns; however, the market factor did partially explain Bitcoin's returns. Model 3 and 4 indicate that profitable factor (RMW) and investment factor (CMA) played a role in Bitcoin's returns. Specifically, the coefficients of RMW and CMA were 0.078 (5% level of significance) and 0.083 (10% level of significance), respectively. In model 5, we included all six factors and it still showed that the MKTRF, RMW, and CMA were the only three factors that could explain Bitcoin's returns. The SMB and HML which are useful in explaining stock returns have not been successful in doing so with Bitcoin. Since the three factors (MKTRF, RMW, and CMA) explained Bitcoin's returns, the abnormal return (α) was no longer significant.

4. Conclusions

Bitcoin is among the first cryptocurrencies and gradually gained its popularity. It has been accepted in many places as a method of payment. However, Bitcoin has gained more attention as an investment asset than as a new method of payment. This might be attributed to the high risk/high reward characteristic of Bitcoin. Our paper focuses on comparing Bitcoin with traditional assets of similar risk-return profile such as public small capitalization stocks, OTC stocks, IPO stocks, and junk bonds. The results show that Bitcoin earned higher returns than all of the traditional assets on average. More importantly, Bitcoin can offer substantial diversification benefits to investors because it was not correlated to those investment assets and only weakly correlated to the stock market. We further examine factors that determined Bitcoin's returns and find that out of the five common factors, only three factors could explain Bitcoin's returns. They are the market factor (MKTRF), the profitability factor (RMW) and the investment factor (CMA). Our findings have important implications. From the investors' perspective, investors should treat Bitcoin more like OTC stocks since they both offer similar returns. In addition, they can improve their investment portfolios by adding Bitcoin because Bitcoin is not correlated with those traditional assets. By knowing which factors are driving forces in Bitcoin's returns, investors can make more informed decisions in Bitcoins. From a government perspective, since Bitcoin brings in diversification benefits to investors, the government might want to officially accept Bitcoin and have more regulations on Bitcoin to protect both Bitcoin sellers and buyers. As a more investors trade Bitcoins, its trading volume and liquidity will increase which in turn leads to higher price for Bitcoin.

5. References

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